CLAIMS

1. An isolated mammalian cell that is multipotent and/or multipotent and that is positive for the surface marker 3G5.

2. The isolated cell of claim 1 wherein the cell has the capacity to differentiate to form at least three differentiated cell types of mesodermal origin and at least one other differentiated cell type from ectodermal, and endodermal origin.

3. The isolated cell of claim 1 wherein the cell is a mesenchymal precursor cell (MPC).

4. The isolated MPC of claim 3 wherein the cell co-expresses the marker MUC18/CD146.

5. The isolated MPC of claim 3 wherein the cell co-expresses the marker alpha-smooth muscle actin.

6. The isolated MPC of claim 3 wherein the cell co-expresses the marker STRO-1^{bri}.

7. The isolated MPC of claim 3 wherein the cell co-expresses a marker selected from, but not limited to, the group comprising THY-1, VCAM-1, ICAM-1, PECAM-1, CD49a/CD49b/CD29, CD49c/CD29, CD49d/CD29, CD29, CD61, integrin beta 5, 6-19, thrombomodulin, CD10, CD13, SCF, STRO-1^{bri}, PDGF-R, EGF-R, IGF1-R, NGF-R, FGF-R, Leptin-R (STRO-2).

8. The isolated MPC of claim 3 wherein the cell co-expresses the markers STRO-1^{bri}, MUC18/CD146, and alpha-smooth muscle actin.

9. The isolated MPC of claim 3 wherein the cell is negative for the hematopietic markers CD45, CD34, and glycophorin A.

10. The isolated cell of claim 1 or 3 wherein the cell is isolated from a tissue of the group comprising, but not limited to, adipose tissue, teeth, dental pulp, skin, liver, kidney, heart, retina, brain, hair follicles, intestine, lung, spleen, lymph node, thymus, pancreas, bone, ligament, bone marrow, tendon, and skeletal muscle.

11. A mesenchymal precursor cell (MPC), capable of forming a clonogenic colony and differentiating to three or more mesenchymal tissue types, isolated from a tissue of the group comprising, but not limited to, adipose tissue, teeth, dental pulp, skin, liver, kidney, heart, retina, brain, hair follicles, intestine, lung, spleen, lymph node, thymus, pancreas, bone, ligament, bone marrow, tendon, and skeletal muscle, and which is positive for the surface marker STRO-1^{bri}.

12. The isolated cell of claim 11 wherein the MPC co-expresses the marker MUC-18/CD146 or alpha-smooth muscle actin.

13. The isolated cell of claim 11 wherein the MPC co-expresses a marker selected from, but not limited to, the group comprising THY-1, VCAM-1, ICAM-1, PECAM-1, CD49a/CD49b/CD29, CD49c/CD29, CD49d/CD29, CD29, CD61, integrin beta 5, 6-19, thrombomodulin, CD10, CD13, SCF, STRO-1^{bri}, PDGF-R, EGF-R, IGF1-R, NGF-R, FGF-R, Leptin-R (STRO-2).

14. The isolated MPC of claim 11 wherein the cell is negative for the hematopoietic markers CD45, CD34, and glycophorin A.

15. The isolated cell of claim 1, 3 or 11 wherein the cell is isolated from a mammal.

16. The isolated cell of claim 1, 3 or 11 wherein the mammal is a human.

17. The isolated cell of claim 1, 3 or 11 wherein the cell has the capacity to be induced to differentiate to form cells comprising one or more of at least osteoblast, odontoblast,

dentin-producing, chondrocyte, tendon, ligament, cartilage, adipocyte, fibroblast, marrow stroma, osteoclast- and hematopoietic-supportive stroma, cardiac muscle, smooth muscle, skeletal muscle, pericyte, vascular, epithelial, glial, neuronal, astrocyte or oligodendrocyte cell type.

18. A differentiated progeny cell obtained from the isolated cell of claim 1, 3 or 11 wherein the progeny cell is at least an osteoblast, odontoblast, dentin-producing, chondrocyte, tendon, ligament, cartilage, adipocyte, fibroblast, marrow stroma, osteoclast- and hematopoietic-supportive stroma, cardiac muscle, smooth muscle, skeletal muscle, pericyte, vascular, epithelial, glial, neuronal, astrocyte or oligodendrocyte cell.

19. An unexpanded population of cells enriched for mesenchymal precursor cells (MPCs) of claim 3 or 11.

20. An unexpanded population of cells enriched for mesenchymal precursor cells (MPCs), capable of forming a clonogenic colony and differentiating to three or more mesenchymal tissue types, said MPCs co-expressing the surface markers MUC18/CD146 and alpha-smooth muscle actin.

21. An enriched population as in claim 20 wherein the MPCs are additionally positive for the marker STRO-1^{bri}.

22. An enriched population as in claim 20 wherein the MPCs are additionally positive for the marker 3G5.

23. An enriched population as in claim 20 wherein the MPCs co-express MUC18/CD146, alpha-smooth muscle actin, STRO-1^{bri}, and 3G5.

24. An enriched population as in claim 19 or 20 wherein the MPCs are negative for the hematopoietic markers CD34, CD45, and glycophorin-A.

25. An enriched population as in claim 19 or 20 comprising at least 0.01% MPCs capable of forming a clonogenic colony and differentiating to three or more mesenchymal tissue types.

26. An enriched population as in claim 19 or 20 comprising at least 0.1% MPCs capable of forming a clonogenic colony and differentiating to three or more mesenchymal tissue types.

27. An enriched population as in claim 19 or 20 comprising at least 1% MPCs capable of forming a clonogenic colony and differentiating to three or more mesenchymal tissue types.

28. An enriched population as in claim 19 or 20 comprising at least 0.01% STRO-1^{bri} MPCs.

29. An enriched population as in claim 19 or 20 comprising at least 0.1% STRO-1^{bri} MPCs.

30. An enriched population as in claim 19 or 20 comprising at least 1% STRO-1^{bri} MPCs.

31. The enriched population of claims 19, 20, 21, 22 or 23 wherein the population has the capacity to be induced to differentiate to form cells comprising one or more of at least osteoblast, odontoblast, dentin-producing, chondrocyte, tendon, ligament, cartilage, adipocyte, fibroblast, marrow stroma, osteoclast- and hematopoietic-supportive stroma, cardiac muscle, smooth muscle, skeletal muscle, pericyte, vascular, epithelial, glial, neuronal, astrocyte, or oligodendrocyte cell type.

32. The enriched population of claims 19, 20, 21, 22 or 23 wherein the population is enriched from a tissue of the group comprising, but not limited to, adipose tissue, teeth, dental pulp, skin, liver, kidney, heart, retina, brain, hair follicles, intestine, lung, spleen, lymph node, thymus, pancreas, bone, ligament, bone marrow, tendon, and skeletal muscle.

33. A differentiated progeny cell obtained from the enriched population of claims 19, 20, 21, 22 or 23 wherein the progeny cell is at least an osteoblast, odontoblast, dentin-producing, chondrocyte, tendon, ligament, cartilage, adipocyte, fibroblast, marrow stroma, osteoclast- and hematopoietic-supportive stroma, cardiac muscle, smooth muscle, skeletal muscle, pericyte, vascular, epithelial, glial, neuronal, astrocyte, or oligodendrocyte cell.

34. An enriched population as in claims 19, 20, 21, 22 or 23 wherein the enriched population is expanded.

35. The expanded population of claim 34 wherein the expanded population comprises at least 0.1% cells which express at high levels one or more of the markers STRO-1, 3G5, or MUC18/CD146.

36. The expanded population of claim 34 wherein the expanded population comprises at least 1% cells which express at high levels one or more of the markers STRO-1^{bri}, 3G5, or MUC18/CD146.

37. The expanded population of claim 34 wherein the expanded population comprises at least 2% MPCs which express at high levels one or more of the markers STRO-1^{bri}, 3G5, or MUC18/CD146.

38. The expanded population of claim 34 wherein the expanded population comprises at least 5% cells which express at high levels one or more of the markers STRO-1^{bri}, 3G5, or MUC18/CD146.

39. The expanded population of claim 34 wherein the expanded population comprises at least 10% cells which express at high levels one or more of the markers STRO-1^{bri}, 3G5, or MUC18/CD146.

40. A method of enriching for mesenchymal precursor cells (MPCs), the method including the step of preparing a single cell suspension from a vascularised source tissue and the step of enriching based on the presence of markers expressed in the vascularized tissue by peri-vascular cells.

41. The method of claim 40, wherein the vascularised source tissue is in the group comprising, but not limited to, adipose tissue, teeth, dental pulp, skin, liver, kidney, heart, retina, brain, hair follicles, intestine, lung, spleen, lymph node, thymus, pancreas, bone, ligament, bone marrow, tendon, and skeletal muscle.

42. The method of claim 40, wherein the step of enriching is based on the presence of the marker 3G5.

43. The method of claim 40, wherein the step of enriching is based on the presence of the marker MUC18/CD146.

44. The method of claim 40, wherein the step of enriching is based on the presence of the marker STRO-1^{bri}.

45. The method of claims 42, 43 or 44 wherein the step of enriching is based on the additional presence of one or more markers.

46. The method of claims 42, 43 or 44 wherein the step of enriching is based on the additional presence of one or more markers selected from the group comprising, but not limited to, THY-1, VCAM-1, ICAM-1, PECAM-1, CD49a/CD49b/CD29, CD49c/CD29, CD49d/CD29, CD29, CD61, integrin beta 5, 6-19, thrombomodulin, CD10, CD13, SCF, STRO-1^{bri}, PDGF-R, EGF-R, IGF1-R, NGF-R, FGF-R, Leptin-R (STRO-2).

47. The method of enriching for MPCs of claim 40 wherein the MPCs co-express the markers 3G5, STRO-1^{bri}, MUC18/CD146, and alpha-smooth muscle actin.

48. The method of claims 42, 43 or 44 wherein the step of enriching is based on the additional absence of a surface marker indicative of commitment or hematopoietic lineage differentiation.

49. The method of claim 48 wherein the cells do not express the hematopoietic markers CD34, CD45 or glycophorin A.

50. The method of claim 40, wherein the enriched MPCs are capable of differentiating into cells comprising one or more of at least osteoblast, odontoblast, dentin-producing, chondrocyte, tendon, ligament, cartilage, adipocyte, fibroblast, marrow stroma, osteoclast- and hematopoietic-supportive stroma, cardiac muscle, smooth muscle, skeletal muscle, pericyte, vascular, epithelial, glial, neuronal, astrocyte, or oligodendrocyte cell type.

51. The method of claim 40 wherein the source tissue for the enrichment of MPC is selected from the group comprising, but not limited to, adipose tissue, teeth, dental pulp, skin, liver, kidney, heart, retina, brain, hair follicles, intestine, lung, spleen, lymph node, thymus, pancreas, bone, ligament, bone marrow, tendon, and skeletal muscle.

52. The method of claim 40 wherein the source tissue for the enrichment of MPC is mammalian.

53. The method of claim 40 wherein the source tissue for the enrichment of MPC is human.

54. The method of claim 40 wherein the enriched population comprises at least 0.01% MPCs capable of forming a clonogenic colony and differentiating to three or more mesenchymal tissue types.

55. The method of claim 40 wherein the enriched population comprises at least 0.1% MPCs capable of forming a clonogenic colony and differentiating to three or more mesenchymal tissue types.

56. The method of claim 40 wherein the enriched population comprises at least 1% MPCs capable of forming a clonogenic colony and differentiating to three or more mesenchymal tissue types.

57. The method of claim 40, wherein the step of enriching is based on the presence of the marker 3G5, and the method includes the further step of expanding the population after enrichment.

58. The method of claim 40, wherein the step of enriching is based on the presence of the marker MUC18/CD146, and the method includes the further step of expanding the population after enrichment.

59. The method of claim 40, wherein the step of enriching is based on the presence of the marker STRO-1, and the method includes the further step of expanding the population after enrichment.

60. The method of claim 57, 58 or 59 wherein the expanded population comprises at least 0.1% cells which express one or more of the markers STRO-1^{bri}, 3G5, or MUC18/CD146.

61. The method of claim 57, 58 or 59 wherein the expanded population comprises at least 1% cells which express one or more of the markers STRO-1^{bri}, 3G5, or MUC18/CD146.

62. The method of claim 57, 58 or 59 wherein the expanded population comprises at least 2% cells which express one or more of the markers STRO-1^{bri}, 3G5, or MUC18/CD146.

63. The method of claim 57, 58 or 59 wherein the expanded population comprises at least 5% cells which express at high levels one or more of the markers STRO-1^{bri}, 3G5, or MUC18/CD146.

64. The method of claim 57, 58 or 59 wherein the expanded population comprises at least 10% cells which express at high levels one or more of the markers STRO-1^{bri}, 3G5, or MUC18/CD146.

65. The method of claim 57, 58 or 59 wherein the expanded population comprises cells of one or more of at least osteoblast, odontoblast, dentin-producing, chondrocyte, tendon, ligament, cartilage, adipocyte, fibroblast, marrow stroma, osteoclast- and hematopoietic-supportive stroma, cardiac muscle, smooth muscle, skeletal muscle, pericyte, vascular, epithelial, glial, neuronal, astrocyte, or oligodendrocyte cell type.

66. A method of expanding MPC of claim 34 by culturing the cells in media supplemented with growth factors.

67. The method of claim 66 wherein the growth factors are chosen from the group comprising, but not limited to, PDGF, EGF, FGF, IGF, VEGF and LIF.